CLAIMS

1. Substantially pure chromium dioxide (CrO_2) having saturation magnetization of at least 115 emu/gm.

2. Chromium dioxide according to claim 1 having saturation magnetization of at least 120 emu/gm.

3. Chromium dioxide according to claim 2 having saturation magnetization of 126 emu/gm for sintered pellets.

4. Chromium dioxide according to claim 2 having saturation magnetization of 132 to 135 emu/gm for cold pressed form.

5. Chromium dioxide according to claim 1, which is in polycrystalline form.

6. Chromium dioxide according to claim 1 having negative magnetoresistance of at least 0.5% near room temperature at 2 Tesla.

7. Chromium dioxide according to claim 6 having negative magnetoresistance of at least 2% near room temperature at 2 Tesla.

8. Chromium dioxide according to claim 7 having negative magnetoresistance of about 5% near room temperature at 2 Tesla.

9. Composites of chromium dioxide and chromium sesquioxide (CrO_2/Cr_2O_3) having negative magnetoresistance of atleast 0.5% near room temperature at 2 Tesla.

10. Composites according to claim 9, having negative magnetoresistance of atleast 2% near room temperature at 2 Tesla.

11. Composites according to claim 10, having negative magnetoresistance of atleast 5% near room temperature at 2 Tesla.

12. Composites according to claim 11, having negative magnetoresistance of 8% near room temperature at 2 Tesla for a 25% molar Cr_2O_3 composite, which is cold pressed.

13. Composites according to claim 11, having negative magnetoresistance of 33% near room temperature at 2 Tesla for a 40% molar Cr_2O_3 composite, which is sintered.

14. Composites according to claim 9, having saturation magnetization of 75 emu/gm at 5K for a sintered 40% molar Cr_2O_3 composite.

15. Composites according to claim 9, having saturation magnetization of 103 emu/gm at 5K for a cold pressed composite of 25% molar Cr_2O_3.

16. Composites of chromium dioxide and Cr_2O_5 (CrO_2/Cr_2O_5) having negative magnetoresistance of atleast 0.5% near room temperature at 2 Tesla.

17. Composites according to claim 16, having negative magnetoresistance of atleast 2% near room temperature at 2 Tesla.

18. Composites according to claim 17, having negative magnetoresistance of atleast 5% near room temperature at 2 Tesla.

19. Composites according to claim 18, having negative magnetoresistance of about 8% at 2T near room temperature for a sintered composite with 80 emu/g M_S.

20. Composites according to claim 18, having negative magnetoresistance of about 22% at 2T near room temperature for a sintered composite with 60 emu/g M_S.

21. Composites according to claims 9 or 16, which can be obtained in cold and sintered form.

22. Composites according to claim 9 or 16, which is homogenous.

23. Composites according to claim 9 or 16, which is obtainable in any ratio of the constituent compounds.

24. Composites according to claim 9 or 16, which has substantial reproducibility in sintered form.

25. A process for manufacture of substantially pure chromium dioxide (CrO_2), or composites of chromium dioxide and chromium sesquioxide (CrO_2/Cr_2O_3) or composites of chromium dioxide and Cr_2O_5 (CrO_2/Cr_2O_5) comprising heating an intermediate oxide to a temperature of between 350 and 500^{0}C for a period of between 1-5 hours whereby substantially pure chromium dioxide (CrO_2), or composites of chromium dioxide or chromium sesquioxide (CrO_2/Cr_2O_3) or composites of chromium dioxide and Cr_2O_5 (CrO_2/Cr_2O_5) are formed.

26. A process according to claim 25, wherein intermediate oxide is converted to said substantially pure chromium dioxide CrO_2 when the temperature is maintained between 390-400^{0}C or to a composite of chromium dioxide and chromium sesquioxide (CrO_2/Cr_2O_3) when the temperature is maintained between 400-500^{0}C or to a composite of chromium dioxide and Cr_2O_5 (CrO_2/Cr_2O_5) when the temperature is maintained between 350-390^{0}C.

27. A process according to claim 25, wherein intermediate oxide used in the process of the invention is prepared by heating CrO_3 and maintaining the temperature in the range of 230-320^{0}C, preferably in the range 250-280^{0}C.

28. A process according to any of claims 25 to 27, wherein said CrO_3 is heated and maintained in the said temperature range for 6-14 hours, preferably 8-12 hours.

29. A process according to claim 28, wherein CrO_3 is heated in dry oxygen/air.

30. A process according to claim 28, wherein CrO_3 is heated at about atmospheric pressure.

31. A process according claim 28, wherein CrO_3 is heated slowly to raise the temperature to about 250^{0}C and then maintained in the said temperature range.

32. A process according to claim 25, wherein intermediate oxide thus formed is cooled slowly to room temperature preferably at the same rate as it was heated.

33. A process according to claim 25, wherein intermediate oxide is crushed in powder form.

34. A process according to claim 25, wherein the said intermediate oxide in powder form is sealed in a tube or can be palletized and sintered before sealing in a glass tube.

35. A process according to any of the claims 25 to 34, wherein the temperature of intermediate oxide is maintained in the said range for 2-3 hrs.

36. A process according to any of the claims 27 to 35, wherein in the composites of CrO_2/Cr_2O_3 and CrO_2/Cr_2O_5, the mass fraction of Cr_2O_3 or Cr_2O_5 can be systematically varied by varying the temperature between 400 and 500^{0}C.

37. Substantially pure chromium dioxide (CrO_2) manufactured by a process according to claim 25.

38. Composites of chromium dioxide and chromium sesquioxide (CrO_2/Cr_2O_3) manufactured by a process according to claim 25.

39. Composites of chromium dioxide and CrO_5 (CrO_2/Cr_2O_5) manufactured by the process according to claim 25.